Astronomy

4-3 The student will demonstrate an understanding of the properties, movements, and locations of objects in the solar system. (Earth Science)

4-3.6 Illustrate the phases of the Moon and the Moon's effect on ocean tides.
Taxonomy level: 2.2-B Understand Conceptual Knowledge

Previous/Future knowledge: In 1st grade (1-3.4), students illustrated changes in the Moon's appearance including patterns over time. In 3rd grade (3-5.4), students explained the relationship between the motion of an object and the pull of gravity. In 8th grade (8-4.4), students will study many of the motions of Earth and the Moon and relate those motions to various effects, including phases and tides. Eighth grade (8-4.7) also explains the effects of gravity on tides and considers tides in relationship to the pulls of both the Sun and the Moon.

It is essential for students to know that the Moon reflects light from the Sun and just like Earth, half of the Moon is always lit by the Sun.

- Because of the positions of the Sun, the Moon, and Earth, the Moon appears to change shape.
- The amount of reflected light from the Moon that is seen from Earth determines the phase.
- The changing shapes of the Moon are called *phases.* There are four main phases:
  - *New moon* – the entire half/side of the Moon facing Earth is dark.
  - *Quarter moon* – half of the side of the Moon facing Earth is lighted and the other half is dark; the Moon appears as a half circle; there are two quarter moon phases in the cycle. NOTE TO TEACHER: Students may see the name also as Half moon.
  - *Full moon* – the entire half/side of the Moon facing Earth is lighted; the Moon appears as a full circle.
  - *Crescent moon* – a small section (less than a quarter moon) of the half/side of the Moon facing Earth is lighted.
- The change in the Moon's phases from new moon to new moon takes about four weeks, 29½ days.

It is essential for students to know that **t**he Moon and Earth pull on each other because of gravity.

- The Moon's pull on Earth makes the surface level of the ocean rise and fall; this change in level is called *tide*:
- High tide is when the ocean water level is the highest; there are two high tides each day.
- Low tides occur between high tides.

It is not essential for students to know about the eclipse of the Moon.

Assessment Guidelines:
The objective of this indicator is to *illustrate* phases of the Moon and the Moon's effect on tides; therefore, the primary focus of assessment should be to give or use illustrations to show aspects of these concepts. However, appropriate assessments should also require students to *recall* information about the Moon's reflecting light, the time it takes for a complete phase cycle to complete, or the cause of tides; or *classify* by sequencing the order of the Moon phases.